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Designing IT-support for citizen advisory services: A self-determination theory perspective

Giesbrecht, Tobias ; Pfister, Joachim ; Schwabe, Gerhard

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DESIGNING IT-SUPPORT FOR CITIZEN ADVISORY SERVICES: A SELF-DETERMINATION THEORY PERSPECTIVE

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Abstract

In public advisory services, the individual's satisfaction depends less on extrinsic factors (e.g., monetary rewards) than on their inner needs fulfillment. Currently used IT-systems supporting citizen advisory services neglect these intrinsic needs of their users, hence insufficiently fostering their satisfaction. In this article, we aim to close this gap by assessing the design requirements needed to develop value-added IT-systems supporting citizen advisory services. We argue that previous developments of design requirements for correspondent IT-systems neglect the users' motives and focus merely on their actions. We thus refer to self-determination theory as a theoretical lens to analyze current literature on how to design adequate IT-systems fostering users' basic needs. In doing so, we introduce design goals and demonstrate to what extent they are fulfilled when these design requirements are implemented in a real-world IT-system that supports citizen advisory services. We follow a design science approach, in which the previously elaborated requirements are implemented in a software prototype, and are then evaluated qualitatively in two user studies with real-world advisors and citizens to assess their suitability relative to the design goals. Our results show that this approach promises to reveal the design requirements that matter in citizen counseling, signifying an important step toward developing a conceptual IT systems design theory.

Keywords: e-government, advice giving, self-determination theory, design requirements, design science

DESIGNING IT-SUPPORT FOR CITIZEN ADVISORY SERVICES: A SELF-DETERMINATION THEORY PERSPECTIVE

1. MOTIVATION AND BACKGROUND

IT-enabled work practices are commonly used in public administration's front and back offices, and continue to flourish due to numerous e-government initiatives. Despite all self-service offers put forward by the different governments worldwide, the personal service encounter of citizens with their government represented by public employees is still of immense importance. In this context, appropriate IT-based support has to keep up with the changing needs of the citizens and with the continuous modernization of the public administration.

In this article, we focus on face-to-face counseling services, where citizens seek advice from public administration's employees to resolve their government-related issues when they enter a novel life circumstance e.g., expecting a child or moving into a new town. We refer to this face-to-face counseling encounter between a citizen and a public administration's employee as *citizen advisory service*. Citizens, which call upon these services, aspire to holistically enhance their current social situation, e.g., expecting a child or moving into a new town. They seek advice as they often are aware of their lack of information, but can't explicate the underlying problems (also referred to as *anomalous state of knowledge*, Belkin et al., 1982), which is a prerequisite for effective problem solving.

When investigating citizens' satisfaction with the IT-support of services, researchers in information system research often concentrate on the individual's system use. *Intention to use* and (actual) *system use* are taken as common measures to obtain indicators for a system's acceptance and, therefore, its real success (Legris et al. 2003). These concepts to measure the success of information systems are discussed in detail in the research literature, originating from service marketing research. They are mainly focusing on the pragmatic quality (Hassenzahl, 2010), which primarily targets the system's characteristics to foster the individual work performance, i.e., the perceived usefulness and the perceived ease of use (for an extensive overview see Carvalho et al., 2010).

Looking at the dyadic service encounter of citizen advisory services, today's models for measuring user satisfaction are often inadequate. On the one hand, some of these models do not sufficiently consider both parties involved, but focus mainly on one, e.g., SERVQUAL (Parasuraman et al., 1988) with its focus on customer satisfaction. On

the other hand, corresponding models do not incorporate users' inner motivation, e.g., UTAUT (Venkateshet al., 2003). Even though this is not always made explicitly, many approaches in Human-Computer Interaction (HCI) research investigating *intention to use* are goal-oriented, focusing on the extrinsic motivation of human behavior, e.g., reward-driven action. They merely focus on the "what" or the "how" regarding the users' actions, but neglect the "why". In HCI research, three levels of goals can be discerned: (1.) be-goals (why), (2.) do-goals (what) and (3.) motor goals (how) (see Figure 1). All these goals are grounded in theories of action, e.g., self-regulation theory (e.g., Carver & Scheier, 2001) or activity theory (e.g., Kaptelinin & Nardi, 2009). Do-goals represent the concrete outcome one wants to attain, "Making a telephone call", for instance. Motor goals, which represent the sub-structure of do-goals, are considered to work below the do-goals. For example, "Making a telephone call" can be decomposed into sub-goals, e.g., "Type in numbers" or "Press *dial*". On top of these two levels of goals are the be-goals, like "Being competent" or "Feeling related to others", for instance. Be-goals give meaning to actions. By knowing users' be-goals, we can determine why they perform actions the way they do. Researchers in HCI often neglect these motives and underlying needs of the users. As Hassenzahl wrote in his book on experience design (Hassenzahl, 2010): "[...] HCI primarily focuses on models, methods, and theories of do-goal achievement". The motives and underlying needs of individual users and their be-goals, particularly gain importance within the context of service provision in public administration because this context differs from most other organizational contexts significantly. A number of studies comparing work motivation in the public and the private sector pointed out that public employees are less motivated by monetary (or other extrinsic) rewards than their private counterparts (see Anderfuhren-Biget al. 2010, Buelens & Van den Broeck 2007, Grant 2008, Rainey 1982). Additionally, public employees on different organizational levels do not seem to be convinced of the incentives and the rewarding effects of extrinsic motivators, such as performance-related pay (Marsden et al., 2001). Furthermore, when taking the organizational context of public administrations into account, Rainey (1982) stated, that an additional problem arises "[...] how to motivate employees in systems which constrain administration of those incentives."

In this article, we want to close this gap and suggest that one has to take another perspective on user motivation and, and ultimately, user behavior to understand the rationales behind user satisfaction of IT-systems supporting public administrators giving advice to citizens. In doing so, we consider the users' underlying needs – the advisor's as well as the client's – that motivate their activities. This approach fits well into the motivational perspective, which Malone (1985) states as one of four important perspectives, one should take on when designing information sys-

tems' interfaces.

- Insert Figure 1 here -

Figure 1. A three level hierarchy of goals (Hassenzahl, 2010).

The current literature on the development of IT-systems supporting advisory encounters in general, and advisor-citizen interactions in particular, proposes a number of design requirements, which have proven to be successful. To assess these current design requirements with respect to user needs, we provide in this article a review of scientific findings on how IT-based citizen advisory services can support the needs fulfillment of both citizens and advisors. We use the self-determination theory (SDT) (see Deci & Ryan, 2000) as a lens to explain the basic needs of the involved individuals. Deci and Ryan, the authors of this theory, postulate that humans are driven by the motivation to lead a self-determined life, and claim that there are three innate psychological needs that humans are constantly aspiring to fulfill: *competence*, *autonomy*, and *relatedness*. Every human action is intrinsically motivated by the expectation that the result or the action itself will fulfill certain basic human needs in a particular context. Accordingly, if these needs are fulfilled – at least to a certain extent – this will result in increased satisfaction (Erpenbeck and von Rosenstiel 2007). Thus, two questions arise, which we want to answer in this article. First, what are the generic design requirements for IT-systems supporting co-located citizen advisory services that assist in the fulfillment of the users' basic needs for competence, autonomy, and relatedness? These principles of implementation are a typical result from conducting design research (Hevner et al., 2004) and represent a valuable component within a information system design theory (Gregor and Jones 2007). Design principles are abstractions of requirements that are not tied to a specific problem but to a certain class of problems. Formulating design requirements, as performed in this article, is one step towards the development of design principles. The second question we address is: How can information technology help to accommodate for user's needs for competence, autonomy, and relatedness in order to augment user satisfaction? By answering these questions, we want, on the one hand, broaden our understanding of advisory information system design, and on the other hand, provide future developers with a useful catalogue of design requirements that should lead to substantially more satisfied users if these design requirements are implemented. By following the theory for self-determination (Deci & Ryan, 2000) , we heed the call for "kernel theories" for design (see Walls et al., 1992). As we will show, self-determination theory is well suited to serve as such a ker-

nel theory for designing advisory support systems. Secondly, we want to contribute to the ongoing research discussion on information system research for electronic services, by drawing the attention on the systems' users with their motivational background and their basic needs, which should be satisfied.

In the following section, we provide a review of the current literature on IT-supported citizen advisory services from the perspective of self-determination theory. In doing so, we derive design goals for appropriate IT-support for face-to-face advisory service encounters and explain them in the context of existing design requirements for similar systems. In section 3, we describe our research design, where we followed a design science approach, and explain the methodology for collecting the data. Subsequently in section 4, we describe the context of use – conventional student counseling service – to highlight the problems and deficiencies today's advisory services suffer. Following the design science research framework, we report in section 4 from the *relevance cycle* (Hevner et al. 2004). In section 5, we enter the *design cycle* and describe the initial design phase of the study: We describe the design solutions for an IT-system supporting face-to-face student advisory services which we developed according to the elaborated design requirements (see section 2). In section 6, we report from the evaluation of the developed design solutions and the following revision and reevaluation. We conclude the article with our reflections on our findings and highlighting the contributions made to the scientific community, i.e. *rigor cycle*.

2. A SELF-DETERMINATION PERSPECTIVE ON IT-SUPPORTED CITIZEN ADVISORY SERVICES

The self-determination theory proposed by Deci and Ryan (2000) is rooted in motivational psychology, and provides an empirically founded theoretical framework to describe the basic psychological needs and their influence on human behavior. It claims three innate psychological needs (competence, autonomy, and relatedness) that all humans pursue at any given time to maintain their psychological health and well-being. Accordingly, we will consider all these aspects from the perspective of the citizens and the advisors. Three design goals will be formulated which should be considered when designing IT-systems supporting self-determined users in their advisory interaction. When referring to the elaborated design goals later we denote them with “*DG1*” to “*DG3*”.

Competence refers to the aspect of successfully dealing with one's environment. In general, this concerns having sufficient information and skills to resolve any occurring issue on one's own. In the context of a counseling service, the client and advisor both want to be competent during their encounter, e.g., influencing the course of their collabo-

ration. Whereas for the citizen this could comprise arriving at a certain state of knowledge, the advisor predominantly has the more complex need for sufficient professional, methodical, and social skills to provide sound advice (Erpenbeck & von Rosenstiel 2007). Accordingly, the first design goal for appropriate IT-support in advisory service encounter should be to *increase the user's competence (DG1)*.

Autonomy refers to freedom of choice and being able to lead a self-determined life. This basic need corresponds well with the counselor's goal of enabling citizens to resolve any government-related problem occurring within their individual life situation (Warschburger, 2009). The concept of autonomy further refers to the constant urge to be the cause of one's own actions, in contrast to the feeling that extrinsic forces cause them. For this reason, the provision of choice and acknowledging people's inner experience enhances their feeling of self-initiation (Deci & Ryan, 2000). Concerning the design of appropriate IT-support, we want to refer to this in a second design goal as *increasing the users' autonomy (DG2)*.

Relatedness refers to the possibility of interacting with others. During the counseling, this need for interaction has to be satisfied. Reis et al. (2000) identify the major types of social activity that might plausibly contribute to a general sense of relatedness. Regarding advisory encounters, the following can be considered relevant: (1) *communicating about personally relevant matters*, (2) *participating in shared activities* and (3) *feeling understood and appreciated*. If IT-systems are applied in advisory situations, they should support these activities in some way in order that *the users' relatedness is fostered (DG3)*.

By applying the self-determination theory, we intend to take a wider perspective and seek to complement our understanding of advisors and citizens as they behave during a counseling session. Thus, in the subsequent paragraphs, we explain how information systems supporting citizen advisory services can foster the advisors' and the citizens' corresponding needs. Therefore, we analyzed the current research literature on (citizen) counseling support to assess to what extent the fulfillment of the users' need for competence, autonomy, and relatedness is addressed. When referring to the elaborated design requirements, later in this article, we denote them with "DRI" to "DR9".

2.1 Requirements for Increasing Competence

Competence refers to successfully dealing with one's environment. According to the SDT, any involved individual within the dyadic advisor-client encounter strives for competence. The main reason for citizens to seek advice from public authorities is the gap in their knowledge of governmental support regarding their present life circumstances.

Apart from their basic need of improving their current situation, citizens are often not able to articulate what they really want (*anomalous state of knowledge*, Belkin et al. 1982). In these situations, human advice is superior to computer-based advice, e.g., electronic services on governmental Web appearances, since a human can empathize with another person and elicit hidden needs in a question-answer dialog. Schmidt-Rauch et al. (2010) and Schwabe et al. (2010) refer to this as *supporting the elicitation of the citizen's implicit needs (DR1)*.

The collaborative nature of the counseling session is one of the most important characteristics due to the fact that: first, a common understanding of the client's problems has to be established and, second, information and knowledge of solutions has to be transferred from the expert (= advisor) to the layperson (= client). Schwabe et al. (2010) purport that collaborative processes evolve and, therefore, cannot be structured beforehand in detail; the authors thus propose that *the state of collaboration must be transparent at all times (DR2)*. They claim that in order to interact actively within the advisory encounter, both the advisor and the citizen must be able to understand the state of their collaboration at any time, e.g., which results have been achieved, how open issues can be addressed etc. We also refer to this design requirement as *process transparency*.

By integrating the client into the problem-solving process, their perception of being responsible for the decisions agreed upon, as well as the final advisory result, will be enhanced. According to Deci and Ryan (Deci & Ryan, 2000), this feeling of responsibility is essential for the heightening of their perceived competence. We refer to this as *supporting joint problem-solving (DR3)*. Schmidt-Rauch et al. (2010) connect this design requirement with the recognized trend within service-oriented marketing (Lusch and Vargo 2006) that clients become co-creators of value (von Luke 2011, Whitaker 1980). Within the first step of the joint problem-solving process, where a common understanding of the citizen's (true) needs is established, the advisor and the citizen individually create their own mental models, which have to be harmonized (Schwabe et al., 2010). Accordingly, the ability to *externalize and share the users' mental models* is a prerequisite for establishing competence, denoted as (*DR4*).

The need to feel competent to advise citizens on their governmental concerns (from the advisors' perspective) and being able to decide on the right "products" (from the citizens' perspective) directly calls for information quality as a pre-condition. This, for instance, is confirmed by DeLone and McLean (1992), who nominate information quality as an aspect of IS success within their IS Success Model. In addition, the advisors' usage of IT is strongly influenced by their fear of acting incompetent, i.e., not being able to answer the client's questions due to inadequate access to information. Thus, an important design requirement is to *improve information quality (DR5)* (Schmidt-

Rauch et al., 2010). For the organizational context of citizen advisory, Schenk and Schwabe (2010) describe correspondent design requirements in more detail. They complement the advisory service by *integrating offline and online information sources from different governmental levels (local, regional, state, federal) (DR5.1)* and *integrating internal and external information (DR5.2)*.

2.2 Requirements for Increasing Autonomy

In the context of co-located citizen advisory services, a key influencing factor of the individual's autonomy appears in the conflict between providing possibilities of choice and structuring of the advisory process. From a "counseling as collaboration" perspective (Schmidt-Rauch and Nussbaumer 2011), there should be features for the users to create and develop their process structures during their ongoing collaboration (Schwabe et al., 2010), even though some predetermined structure is necessary to support mutual understanding of the current (process) status and the upcoming activities. We refer to this as *support evolution of process structure during collaboration (DR6)*.

One of the main objectives of an advisory session should be to empower the clients so that they can resolve their problems on their own (Warschburger 2009). Therefore, an important first step is to personalize the information provided within the advisory encounter and to adapt it on the citizen's individual situation. Increased personalized information leads to a higher autonomy for citizens as a result of having increased options (Aschoff and Schwabe 2011). We refer to this as *supporting the personalization of information (DR7)*.

According to their individual roles within the ongoing collaborative problem-solving process, both advisors and citizens must have, to a variable extent, the capability to alter the direction of the counseling. The advisor should guide citizens through the process, and thereby act as a mentor, eliciting their true needs and conjointly developing suitable solutions to fulfill these needs. We refer to this as *support flexible aggregation of information (DR7.1)*. Although the advisor needs sufficient possibilities of control to navigate through the process, the clients – in order to feel as equal collaboration partners – must still be given the possibility of intervening in the advisory process, which in turn, will augment their feeling of self-determination.

2.3 Requirements for Increasing Relatedness

Relatedness refers to interacting, feeling connected, and experiencing caring for others. Deci and Ryan (Deci & Ryan, 2000) claim that intrinsic motivation will be more likely to flourish in contexts characterized by a sense of secure relatedness. Within citizen counseling, both participants must be supported in fulfilling their need for related-

ness. In the following paragraphs, we use the social activities that contribute to an individual's sense of relatedness (as described in the beginning of the chapter) in order to assess the design requirements in this regard.

The previously stated requirement of *supporting the personalization of information (DR7)* is a first prerequisite for communicating personally relevant matters, and to engage in a close relationship. Schwabe et al. (2010) posit that the IT-support should *allow the user to establish a personal relationship during, and develop it after, the interaction (DR8)*. This requires establishing an intimate ambiance, where the advisor listens and responds to the citizen. This can be supported by the exchange of personal information, as it fosters trust (Friedman et al., 2000), and by integrating “more trusted” information sources, such as external (*DR5.2*) information.

Supporting the elicitation of the citizen's true needs (DR1) is beneficial for a citizen's feeling of being understood and appreciated. Schwabe et al. (2010) propose that a verbal discussion on problems and possible solutions is a more natural means of collaboration. The advisor can use his background knowledge and empathize with the citizen to uncover hidden information needs and offer advice not explicitly requested. We refer to this as *base the interaction on verbal communication (DR9)*.

- Insert Table 1 here -

Table 1. The literature-based design requirements assigned to the SDT-needs

Table 1 provides an overview of the derived design requirements for IT-systems supporting co-located citizen advisory services. Thereby, the individual requirement is allocated to the user's respective need for competence, autonomy or relatedness.

3. RESEARCH DESIGN AND DATA COLLECTION

The question for essential design requirements emerged in the course of a larger research program investigating IT-support within co-located citizen advisory services. Therein, a first prototype had been developed to confirm the general feasibility of supporting citizen advisory services by means of an IT-system; the evaluation was done in a

real-world setting assisting the counseling of pregnant women (see Bretscher 2009, Schenk & Schwabe 2010, Schwabe et al. 2010).

Following the self-determination perspective, we formulated design goals related to the three basic psychological human needs for competence, autonomy and relatedness (see section 2). These design goals should be considered when designing IT-systems supporting self-determined users in citizen advisory services. Based on the findings of prior research, we first reviewed the current state of design requirements proposed in the literature on IT-based citizen advisory support systems and mapped them to the design goals. Building on these insights from the *knowledge base* (Hevner et al. 2004), we conducted two “design and evaluate” cycles (Hevner 2007) to assess the current design requirements to see if they support, in practice, the fulfillment of the users’ basic needs. According to the exploratory nature of the study, we assessed the extent to which the system assists the fulfillment of the user’s needs by observations from outside (e.g. inspecting and observing the current environment and practices) and supplemented our findings by qualitative responses from interviews conducted with the respective users (see Stebbins, 2001). Thereto, we specify a context of use (section 4), develop appropriate design solutions according to the design requirements (section 5) and evaluate them in a user test (section 6). We followed an approach with two iterations, where we refined the design requirements, based on the key findings of a first evaluation, re-implemented the design solutions, and conducted a second user test.

Context of use: We report from our comprehensive exploratory research to specify the context of use (see Stebbins, 2001), i.e., student counseling services. Thereby, we followed the Needs Driven Approach (Schwabe and Krcmar 1996) to assess the advisors’ work environment. Our interview guidelines based on Wilson’s model for information behavior (Wilson, 1997) to assess students’ and advisors’ information seeking behavior. For that purpose, a total of 13 interviews (with two advisors and eleven students) were conducted. On average, an interview lasted 70 minutes. The participants in the interviews were exchange students, which arrived at the university only within the last 6 month and had at least one counseling sessions before. Following our self-determination focus, we assessed the current situation regarding the basic users’ needs for competence, autonomy, and relatedness to disclose deficiencies, and also assess practices that should be preserved.

Design solutions: According to the literature-based design requirements, we developed design solutions and implemented them in two software-prototypes intended to support advisors and students in their advisory-related activities. In this first iteration of our approach, we implemented a set of design solutions and evaluated them in a user

test (see evaluation section). In a second iteration, we refined the prototype based on the key findings from the first test. Specific design solutions were implemented in order to highlight the added value IT-support can provide to advisory services in public administrations, but also to demonstrate the problems the same IT-support can cause.

Evaluation: In the first user test, we conducted eleven counseling sessions with two advisors from the international relations office (IRO) of the authors' university and eleven students to assess the developed design solutions. These sessions took place in a small meeting room, lasted typically 20-30 minutes, and were observed by two researchers focusing on the activities and interactions of the individual participant. The advisors had received a training lesson beforehand (about 45 minutes), where they became acquainted with the manipulation of the IT-tool's functionalities and were informed of the corresponding advisory objectives. Subsequent to the counseling session, both students and advisors completed similar questionnaires and an interview. On average, these interviews lasted 30 minutes. Both the questionnaires and the interviews contained elements of their perceived acceptance of the IT-system (UTAUT, Venkatesh et al. 2003), their perceived satisfaction (Yield Shift Theory, Briggs et al. 2012) and their perception of the system's pragmatic and hedonic qualities (AttrakDiff, Hassenzahl et al., 2003), which has its roots in the self-determination theory. Following an explorative approach, using qualitative data, we focus on the interviews and the observations of the participants' actual behavior, which together constitute our primary data sources.

In the second evaluation, we refined the first prototype's functional support to increase the users' ability to visualize and alter information in a higher level of detail. For this purpose, we revised the prototype and tested the new software prototype with the same two advisors as in the first test by conducting eight student counseling sessions. Therefore, the experimental setup was changed to a within-subject design in order to facilitate comparison between the two systems. Both advisors used the old and the new prototype in equal parts to give advice to students. We ensured that all students had experienced both situations. Some started with the old situation, whereas others started with the advisory session supported by the new prototype. The rest of the experimental setup was equal to the first evaluation (20-30 min counseling session, 45 minutes of training for the advisors, two observers within the advisory sessions). However, in the subsequent interviews with the advisors and the students, we focused on the comparison of the two IT-tools and compared the responses from the interviews with the observations made during the counseling sessions.

In section 6, we report on these evaluation results to discuss the literature-based requirements from the self-determined users' perspective, and develop a final catalogue of design requirements, whose implementation should plausibly foster the users' need fulfillment, i.e., their satisfaction.

4. CONTEXT OF USE: CONVENTIONAL STUDENT COUNSELING SERVICE

A major task of the international relations office (IRO) is to give assistance to foreign students, e.g., visa-related issues, finding accommodation, or registering with authorities. Conventional work practice is oriented towards providing all relevant information before students arrive. For that purpose, printed information (brochures, leaflets, forms, etc.) is sent to the students, and is also presented on the university's Web sites. Students can also contact the IRO via e-mail, telephone and during open consultation hours on a first-come, first-served basis.

Face-to-face advisory services are provided at a counter consisting of a large bar table attached to the wall on which a computer is placed. The student and the advisor stand next to each other so that documents can be placed on the table and the computer screen can be jointly viewed. The advisor sometimes presents the desired information directly on the Web sites of an authority. Bookmarks, maintained collaboratively by the advisors, are used very often to navigate quickly to the right site – reflecting the students' recurring information needs.

There is no pre-defined advisory-process. Instead, in most encounters the IRO-advisor responds to questions of the student and answers them in the ensuing dialogue. The results of an advice-giving session are also not documented systematically. Sometimes students take notes (e.g., the URL of the Web sites), or they are presented with a printout of the Web page or brochures, etc.

In the following sections, we provide illustrative examples of how the self-determinations theory's dimensions competence, autonomy, and relatedness are addressed by the conventional practice of advice-giving, as seen from the students' and advisor's perspective. The findings are drawn from the observations and interviews that were conducted with the advisors and the students.

4.1 Competence in Conventional Advice-Giving

Whereas for students competence signifies having sufficient information to resolve their problems on their own, the advisors' association of the term predominantly refers to the ability to provide sound information.

Within the current work practices, the students constantly suffer from having “insufficient competence.” This can be seen in the predominant task of providing information by the IRO-advisors. As the advisors restrict themselves to answering explicit questions and providing the corresponding information, students do not get any methodical knowledge to resolve future similar requests on their own. Accordingly, as reported in the interviews, students developed their own strategies comprised of a network of experience-based information sources, e.g., friends, family, online forums and blogs for expatriates. In summary, it seems that the advisors’ current practices did not adequately foster the student’s perceived competence.

The IRO-advisors’ vocational training follows a learn-by-doing principle, i.e., start giving advice and asking colleagues if problems with students’ requests occur. They also used a bookmark list on the shared computers to profit by the other advisors’ experience. Accordingly, the advisors relied (at least in the first few advisory sessions) on the bookmark list and the quality of the information provided there – including non-functioning Web links. Such an environment where the students could see when advisors had to ask someone for help, or needed to search for solutions due to insufficient information sources, hampered obviously the advisors’ need to appear competent in the eyes of their clients.

4.2 Autonomy in Conventional Advice-Giving

The individual’s sense of autonomy is closely related to the perception of freedom of choice. In conventional student counseling services, the predominant interaction pattern – a question-answer scheme – suggests a distinctive role allocation: the advisor uses his competencies and knowledge to deliver answers and solutions to the student’s information need, as interpreted from the question asked.

The students, on one hand, can “control” the advisor’s behavior with their questions, i.e., the students can get the desired information personalized to their problems. On the other hand, the observed advisors’ behavior shows that they concentrate only on giving answers, but provide no background information that would be vital for related needs. The advisors gave reason to this behavior by referring to their counseling objective of bringing “students to autonomy.” In summary, the advisor’s autonomy is low in the conventional advisory practice; however, it is unclear if this matches their perception.

4.3 Relatedness in Conventional Advice-Giving

Concerning the need for relatedness, the advisor and the student both strive to feel related (1) to one another and (2) to their respective social environment. The conventional work practice of IRO-advisors focuses on the students' sense for relatedness. In other words, the advisors establish a personal relationship with the student for the duration of the counseling session. Accordingly, as evidenced from the questionnaire results, the students highly valued the advisor's social skills (judged on average 6.4 on a Likert scale where 7 equals the positive maximum). Notably, students showed in their information seeking behavior that they predominantly referred to information sources from personal experience (e.g., former exchange students or forums for expatriates), but the advisors did not refer to this aspect of relatedness.

The advisors' need for relatedness is fulfilled only to a small extent. The examples of the shared bookmark list (see above) signify the main activities fostering relatedness within the actual session. The advisors also criticized the current possibilities of professional interaction and gave rationale regarding unsuitable resources (including IT means) available to them.

5. DESIGN SOLUTIONS: IT-BASED ADVISORY SUPPORT IN PRACTICE

To assess the literature-based design requirements (see Table 1), we contextualized them within the real-world setting of a student counseling service (described in the previous section). We developed appropriate design solutions and implemented them in two software-prototypes. These tools support the elicitation and documentation of the counselor's needs as well as the proposed solutions. The participants can jointly interact with the tool in order to retrieve and visualize the organization's pre-configured information for this counseling session. In the following paragraphs, the instantiation of the design solutions are described and illustrated. For the technical implementation, we used Silverlight (XAML) for the UI-Design and C# with the .NET Framework 3.5 in the back end.

At the beginning of the counseling session, an advisor from the IRO (Sally) and a student (Kate) take a seat in front of a large touch-sensitive screen (HP Touchsmart, see Figure 2) and start talking about Kate's requests. Hearing of Kate's problem how to get a job, Sally opens a new memo card and labels it "getting a job" (*DR 4, 8*; see Figure 3 on the left). The memo card contains different functions: 1) The client's request can be noted down, 2) Ade-

quate solutions can be added and, 3) The card is part of a “drag and drop” construct to support the forming of a personalized advisory process. Therefore, the memo cards act as central element in the counseling support application.

Before Sally starts to solve the first problem, she asks if there are other issues that Kate wants to discuss (*DR9*). In the course of the conversation, Sally adds two more memo cards, “health insurance” and “public transportation possibilities” (see Figure 3). She then opens a list in the upper left corner of the screen, noting that there are recurring problems facing students. She mentions to Kate that if she sees some interesting topics, she should click on them to generate pre-completed cards, which they could discuss later (*DR1*). Finally, Sally groups the memo cards on the screen by shifting them around with her finger, thus establishing a (simple) process structure that suits her and Kate for the subsequent problem-solving (*DR 3, 6*).

- insert Figure 2 here -

Figure 2: General physical setup

Picking the first memo card “getting a job,” Sally shows Kate a Web site with job offers suitable for students, e.g., part-time with flexible working hours (*DR5*). For this purpose, she moves the concrete problem memo card with her finger on the “Web site” icon at the bottom and navigates it to the corresponding screen (see Figure 4 on the left). By physically keeping hold of the problem and taking it with her into the next advisory phase of designing an appropriate solution, Kate could follow the counseling process more easily. Sally now chooses from a list of governmental, university and, third party Web sites, as well as online forums for expatriates (*DR5*) one covering job markets and displays it. After a short discussion of the job category suitable for Kate’s situation, Sally adds the Web link to the problem memo card (see Figure 4, on the right side of the application’s screens) (*DR7*).

- insert Figure 3 here -

Figure 3: Main screen of the application

They continue to process Kate’s problem by reviewing government information on work law. Sally also supplements this information with some additional useful hints from her (*DR 7, 8*). She mentioned that Kate has to have a work permit and that she has to visit the local authorities’ office to apply for one. Thereto, Sally changes to the planning screen of the application (see figure 4, on the right), discusses with Kate what date would be suitable for her to make this visit and added it to the memo card. In doing so, she verbally added useful information like what docu-

ments to bring along. Subsequent, they return to the main screen and agree on “closing the card”, i.e., end the problem-solving process (DR2).

- insert Figure 4 here -

Figure 4: Website screen (left) and planning screen (right) of the application

In this way, Sally and Kate work through all preliminarily created memo cards. After finishing the last one, Sally explains to Kate that she could either send her all the information that they gathered by e-mail, or she could print it for her. As Kate would like to receive it electronically, she gives Sally her e-mail address. They conclude the advisory session with Sally wishing Kate all the best on her job search.

6. EVALUATION OF IT-SUPPORTED STUDENT COUNSELING: SELF-DETERMINED USERS

The software-prototype comprising the elaborated design solutions (see section 5) was evaluated in test settings, where advisors gave advice to students using the developed IT-support. We wanted to show to what extent the three design goals, i.e., the advisors’ and students’ needs for competence, autonomy and relatedness, were met. We conducted two iterations of the “design and evaluate” cycle (Hevner 2007): In the first iteration, advisors used the developed IT tool to give advice to (foreign) students regarding their “living and studying in a new country”. Subsequently, the prototype was revised according to the key findings of the first evaluation. The test setting had to be changed, too, in order that advisors and students could do a comparison of the first and a revised second prototype. Thereto, a within-subject test design was applied. Furthermore, the prototype’s functions have been expanded in order to empower its users to visualize and modify information on a fine-grained level (see reasoning below). All the modifications and new functionalities intend to develop more appropriate, and more personalized solutions to the client’s problems. With the insights from this comparison, i.e., the second iteration, we could refine the design requirements for IT-supported citizen advisory services even further and gain deeper insights we would not have discovered otherwise.

6.1 First Evaluation: Assessing the Design Requirements

Whereas the students in our tests valued their perceived satisfaction with the IT tool well (on average 6 on a Likert scale where 7 equals the positive maximum), the advisors were moderately satisfied (on average 4.75). Although

these subjective user statements support the impression that their expectations were met, but the users' underlying basic needs were fulfilled to a varying extent. Therefore, we want to discuss the evaluation results in more detail.

The Users' Need for Competence

In the test sessions, the students valued the information and instructions received as being comprehensible and useful; they also perceived themselves to be competent in solving their personal problems using the received information. The students appreciated the links between the problems and the solutions noted on the memo cards – a significant feature they missed in the traditional counseling situation. Further, the virtual memo cards made it easier for them to recall the stage of the advisory process (or the distinct problem-solving process “on one card”) in which they were currently engaged. In particular, the advisor's arrangement of the cards seemed to be a useful structuring aid, not just enhancing the transparency of the advisory process, but also giving students the required knowledge to participate actively.

As public administrations rarely see themselves to the same extent as service providers as private sector firms, many advisors in public administrations do not have an advisory-related background where clients are seen as customers. Nevertheless, advisors in public administrations want to exert their advisory-related skills. For them, some of the most important skills are competent information provision and professional guidance through the advisory process. As to the first objective, the advisors made extensive use of the (different kinds of) information sources provided, and thus responded more in depth to the students' individual problems. This was described not only by the students as being “more individualized service”, but the advisors also described this way of working as a “more satisfying information provision”.

Concerning the second part of the advisors' need for competence, their methodical skills, they appreciated the memo cards because of the possibility of structuring the counseling session while still being able to customize it at any time. Although the “memo card”-metaphor performed well in this respect, it did not address the advisors' weakness in adopting a proper advisory process (Schwabe et al. 2010).

The information provided by the IT-system reflected the document-centric work practice, as it appears in working environments in today's public administrations. In consequence, distinct information elements are widely applicable, but hardly adaptable, as they couldn't be decomposed in any way, e.g., information brochures, forms or legal texts. However, during the user tests with IT-support, the advisors often wanted to access information on a more detailed

level. The advisors appreciated the simplified access to the desired information; that is why they spent more time exploring this information together with the students. In consequence, we suggest that information must be generally provided on finer levels of detail, so that it can provide the necessary added value to the counseling session. Therefore, the design requirement *DR5* should be supplemented with *DR5.3: Provide detailed information*.

The Users' Need for Autonomy

The observations in our test have shown that the advisor is de facto the only user directly operating the IT-tool. However, the students perceived themselves to have sufficient possibilities of influencing the advisory session's course of action by observing every activity in the information system and having the possibility to intervene whenever necessary. Thus, their perception of autonomy did not appear to suffer. The correspondent measurements of the system's hedonic qualities back these statements (on average 4.27 on a Likert scale). Further, the students reported that by using the IT-tool, the advisor was able to respond in a more individual way; consequently, they perceived themselves as being more in the advisor's center of attention.

Even though not noticed by students, the advisors showed clear deficiencies in certain phases of the advisory process, e.g., in verifying whether the advisory goals had been achieved. During the tests, the advisor did not finish the counseling session, for instance, by providing a big picture of the student's problems and corresponding solutions. Instead, they proposed that students should "come back if there were any ambiguities". As IT can provide substantial added value in this respect, we recommend that advisory supportive IT should *support the advisory structure with mandatory activities (DR6.1)*. This means that important advisory activities, e.g., externalizing the client's needs, would have to be carried out. But to preserve the users' (perceived) autonomy, in contrast to a given process structure, advisors and citizens would be free to decide when to accomplish the mandatory activity.

In the tests, the developed software-prototype supported its users in their flexible information aggregation that contributes to solve the students' problems. The advisors as well as students recognized this clearly as an added value: The students felt that the obtained information was tailored to their situation and the advisors welcomed the flexibility how they could aggregate the information. However, the advisors criticized that they could not supplement this information with their experiential knowledge what would have been – according to them – a better strategy to adapt to the student's evolving information needs. This finding should be addressed and appropriate IT-support provided since this signifies one of the key characteristics of public administration. In order to better assist advisors and

clients in personalizing their advisory encounter, the corresponding design requirement (DR7) should be expanded with DR7.2: *Support the annotation of information*.

The Users' Need for Relatedness

The students' expectations with respect to their need for relatedness focus mainly on their relationship to the advisor. In the context of citizen advisory services, clients commonly assign the advisors good social skills. In this regard, the students in our test sessions perceived the IT-tool as "ideal externalization and documentation of the verbal discussion and the solution finding process." For this reason, the IT-tool seemed to fit well in the dyadic advisory encounter, supplementing the personal relationship between the advisor and the student. This is an important objective for advisory supportive IT, considering the fact that deployed IT often acts as a communicational barrier in advisory sessions (Rodden et al., 2003).

The advisors associated with their perception of relatedness (1) with the client and (2) with their colleagues at work. Regarding the first aspect, the observations of the advisors' behavior revealed that they tended to separate the used IT-tool from students. This means, that advisors engaged in an intense verbal discussion with students and neglect their task of encouraging students' IT use, thereby integrating them as equal collaboration partners. The advisors gave rationale to this behavior by referring to their work motivation as: "get to know people from other cultures and their experiences." Accordingly, the users' conceptions of counseling seem to influence users' behaviors and IT tools' developers should take this into account.

The second aspect of the advisors' sense for relatedness concerns their professional and social interactions with their colleagues at work. As this refers strongly to the advisors' vocational qualification phase, it could not be assessed in the tests conducted. However, the observations of the current work practices (see section 4) highlighted the advisors' need for an adequate IT-supported solution. Respective IT-support should establish a learning community, where the advisors could *communicate with one another and interchange professional knowledge (DR10)*. This has already been suggested by Wang (2003) as a requirement for electronic learning system.

Table 2 shows the set of design requirements resulting from the first iteration of the "design and evaluate" cycle. The new requirements resulting from the observations of the first trial are marked in bold.

- insert Table 2 here -

Table 2 . Set of design requirements for advisory supportive IT after the first evaluation (additions marked in bold)

For better understanding of the design requirements and their successful implementation, we decided to refine the first prototype based on the key findings of the first evaluation. In detail, we adapted the design requirements *DR7.1* and *DR7.2* (dealing with the aspect of service personalization) as well as *DR5.3* (dealing with the level of detail of the information stored within the advisory support tool). Therewith, we wanted to provide the advisor with better IT-support to guide the client through their collaborative advisory encounter and to personalize the developed solutions in a more detailed level. In the second „design and evaluate“ cycle, the prototype’s functions to visualize and modify time-related information were revised and some new visualization and interaction possibilities were added to them (see Figure 5). This opened up the opportunity to show time-related information on a fine-grained level and to allow students and advisors to modify, and thus personalize, these information items. In the first prototype, a “standard” calendar entry had to be selected from a table (see left side in both pictures of Figure 5) only allowing personalization by changing the exact date with the help of the calendar. The advisors in this first test remarked that in doing so, they cannot adequately apply their experiential knowledge for the students’ benefit: They were able to talk about everything orally but at the same time, the advisor was incapable of document this information with the help of the existing prototype. To tackle this problem, the second prototype (see Figure 5 on the right) offers an additional window for each selected calendar entry that will show more details and allows their modification at the same time. For example, it was now possible to edit the description of a calendar entry. This helps an advisor to adapt and personalize information to a student’s specific needs. The next section portrays how these modifications contributed to a different usage of the IT-system and how they helped to achieve the three design goals.

- insert Figure 5 -

Figure 5: Providing detailed and adaptable information: the “planning”-part of the time screen in the first prototype (left) and the second prototype (right)

6.2 Evaluation of the second cycle: Refinements

Overall, the advisors and the students appreciated the revised prototype (*satisfaction* was judged on average 5.9 for the advisors and 6.23 for the students on a Likert scale where 7 equals the positive maximum) and clearly favored the revised over the old design. However, the observations and the insights from the qualitative interviews with the

advisors revealed serious drawbacks of the improvements made to the IT-system. In the following paragraphs, we want to highlight the findings from this second evaluation in order to again improve the design requirements.

The Users' Need for Competence

Initially, all stakeholders welcomed the increased level of detail with respect to the information provided by the new prototype. On one hand, the advisors appreciated the additional informational depth as they could use it to find more suitable solutions together with the students, i.e., the prototype supported them concerning their professional competence. On the other hand, longer periods where advisors and students focused only on the tool were observed and their oral conversation was interrupted. We argue that this is due to the more comprehensive provision of information: The advisors felt obliged to explain all the information provided by the system. Therefore, they also tried to explain information to the student that was less familiar to them. This is an activity the advisors would not engage in during a traditional advisory encounter. In consequence, advisors and students needed even more time to process the more detailed information. In addition, the advisors felt unsatisfied, as they had to reveal knowledge gaps in front of the student unintentionally. During the test sessions, the advisors bypassed this issue by omitting entire blocks of information, which understandably has a negative effect on the entire advisory service's quality. Based upon the empirical observations, we conclude that information should be provided with different levels of detail. This enables the advisors to integrate information into the advisory session at the appropriate level of detail. In practice, this means that the advisors then could choose the appropriate level of detail they want to explore together with the students, according to their assessment of the students' knowledge needs. Steinmetz (2011) made similar observations in context of citizens' services over the telephone. Therefore, we want to refine the design requirement dealing with information quality (DR5) with *DR5.3 Provide different levels of detail*.

The Users' Need for Autonomy

To support the advisors' autonomy, comment fields for personal notes were integrated in the new prototype. Therefore, the advisor had the ability to complement the existing information with their experiential knowledge. During the second user test, the students appreciated this additional functionality as it helped the advisor to personalize the information better (supporting *DG3*) in their concrete situation by sharing their expertise more easily (supporting *DG 1*). As observed in the tests, the advisors and students always had the freedom of choice whether they wanted to annotate the information provided and to what extent. However, an even bigger problem appeared which is typical

for the domain of public administration: Information is provided often on a generic level, so that it is widely applicable. Therefore, documents, e.g., brochures, leaflets, etc., are often distributed as whole information units, whereas single extracts would have been better. However, the advisors especially criticized this document-centered work practice. They mentioned that they could not access integral parts of the information provided. Thus their annotations could not be allocated accurately. The advisors had to attach explicit explanations regarding the association of their annotations with an integral part of an informational item. In doing so, it interrupted their flow of conversation with the student, as the student waited for the advisor to finish typing the “meta information”. As a consequence, *DR7.1* should be refined to *allow annotation on fine-grained information*. In addition, we want to state the general constraint that the implementation of a design requirement, i.e., the respective functions or their use during the advisory encounter, should not affect the direct advisor-client communication. As this constraint should be applied to all design requirements (see description below), it will not be added to *DR7.1* solely.

The Users’ Need for Relatedness

Regarding the first two design goals – to increase competence and autonomy – the stakeholders in the second test frequently made positive experiences using the revised software prototype. This was significantly different concerning the third design goal aiming at increasing the users’ relatedness. For the second prototype, it was observed in the test that the IT-system dominated the advisory encounter much more. Compared to the situation supported by the first prototype, the advisors and the student’s attention increasingly shifted on the IT-tool. The stakeholders’ relationship suffered, as their verbal conversation was interrupted, triggered by longer periods of intensive interaction with the IT-tool. Advisors and students confirmed that a more impersonal advisory atmosphere was created. Within citizen advisory services, the verbal communication between the advisor and the client is very important and should not suffer from the introduction of IT-support. Accordingly, a general constraint applicable to all design requirements can be stated, originating from the perspective on the users’ relatedness: *Implemented functions and their use should not affect direct advisor-client communication*.

To summarize our insights from the two “design and evaluate”-cycles, Table 3 shows a final set of design requirements. The new or adapted requirements resulting from the observations of both user tests are marked in bold. Due to our iterative approach and by applying a self-determination perspective, we were able to build a ‘better-founded’ design requirements catalogue for respective information systems.

- insert Table 3 here -

Table 3. Final set of design requirements for IT-systems supporting self-determined users in citizen advisory services; additions and modifications compared to the literature-based design requirements are marked in bold

7. CONCLUSION AND LIMITATIONS

In this article, we investigated the design of IT-systems supporting co-located citizen advisory services. We argue that in order to develop a sound design theory for IT-based advisory support systems, researchers have to take on a more holistic view on the system's users: Not only the actions, users perform during the advisory service encounter, i.e., their do-goals and their motor goals, have to be considered, but also their motives and needs, i.e., their be-goals. By applying the self-determination perspective on all user groups, i.e., advisors and citizens with their individual need for competence, autonomy and relatedness, we could reassess and refine design requirements from the existing research literature and develop additional ones, which would hardly have been disclosed otherwise. Thereto, we followed a design science approach, where we developed design solutions and integrated them within a prototype of an advisory support information system in order to evaluate them: We presented our findings from two "design and evaluate"-cycles wherein we conducted counseling sessions in a real-world context of student counseling services to evaluate and refine the developed design requirements. Finally, we elaborated a set of design requirements (see Table 3) whose implementation should substantially foster user satisfaction. Therewith, we want to contribute to the ongoing research discussion on information system design by highlighting the benefit of integrating users' motives and needs into design consideration.

Basing our approach on the self-determination theory allowed us to broaden our understanding of user satisfaction of IT-systems supporting advisory encounters. We highlighted the relation between the users' needs for competence, autonomy and relatedness, and their satisfaction with the service, either receiving it as a client or providing it as an advisor. In doing so, we were thus able to build a 'better-founded' catalogue of generic design requirements for the class of citizen advisory support information systems. With this catalogue and the self-determination theory as kernel, we could take an important step forward in the building of a conceptual design model for citizen advisory support systems (see Walls et al., 1992 or Gregor & Jones, 2007). Furthermore, as our second contribution, we highlighted the importance of considering users' needs and motives, i.e., their be-goals, when designing IT-systems sup-

porting advisory services. We suggest that further research should include the assessment and enhancement of the developed catalogue by considering additional models describing user satisfaction and its underlying motives from other perspectives (e.g., Briggs et al. 2012, Carter & Bélanger 2005, Erpenbeck & von Rosenstiel 2007). Furthermore, comprehensive models describing the determinants of user behavior in citizen advisory services, should be developed, as they represent a necessary prerequisite to understand user behavior and, hence, for the development of useful design models.

In design-oriented research, it is often difficult to generalize the findings concerning a concrete artifact to a class of systems: The effects measured or observed could be caused due to insufficient design or due to specific characteristics of the organizational or social context: Finally, the IT-systems success depends on its meaningful use within a beneficial environment. One way to cope with these circumstances better in future research, could be to include measurements for the individual user's need fulfillment as he/she perceived it. Correspondent measurement tools, like the *Intrinsic Motivation Inventory* (based on Deci & Ryan, 1985), should be integrated in the questionnaires and interview guidelines used to collect adequate data.

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Figures and Tables:

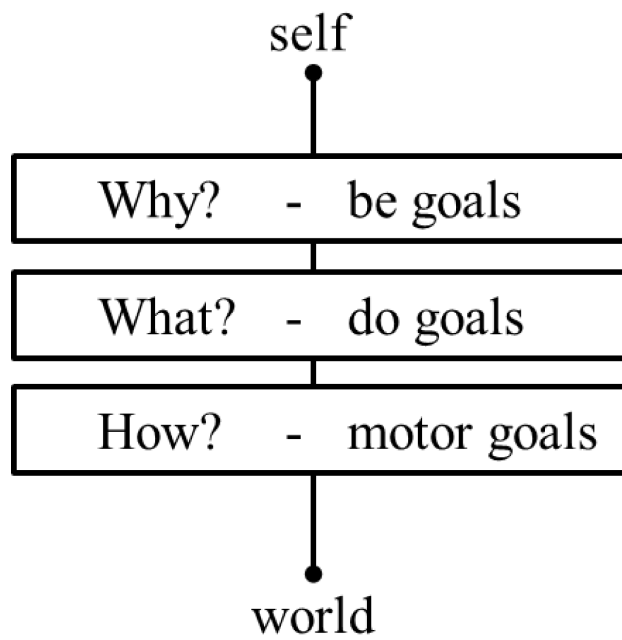


Figure 1. A three level hierarchy of goals (Hassenzahl, 2010).

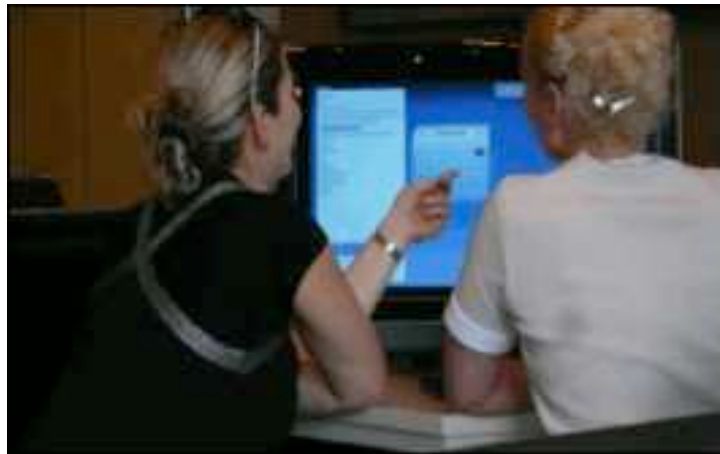


Figure 2: General physical setup.

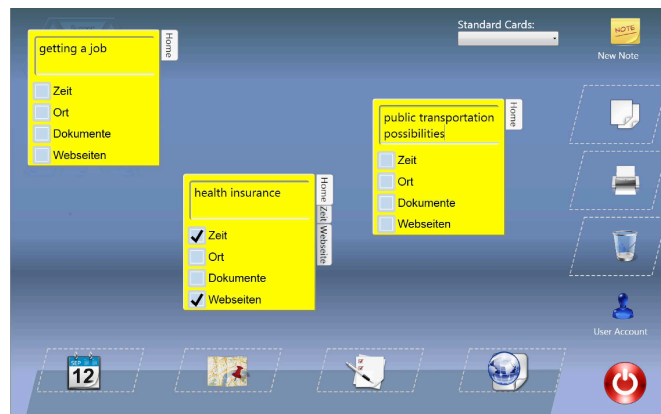


Figure 3: Main screen of the application.

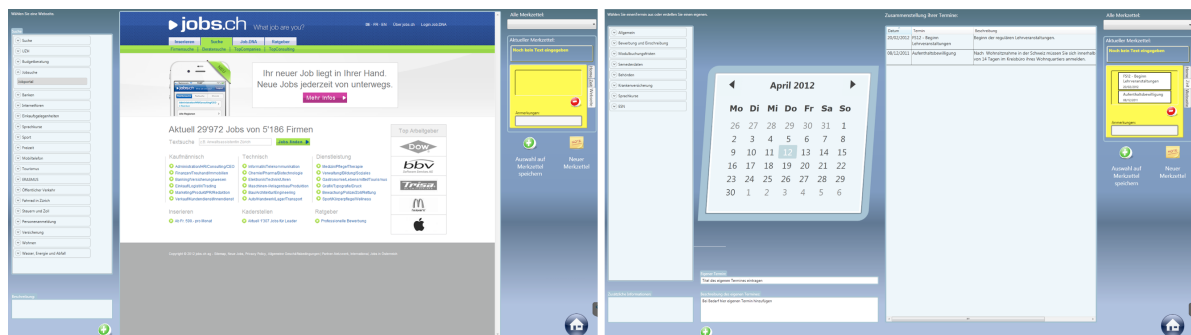


Figure 4: Website screen (left) and planning screen (right) of the application.

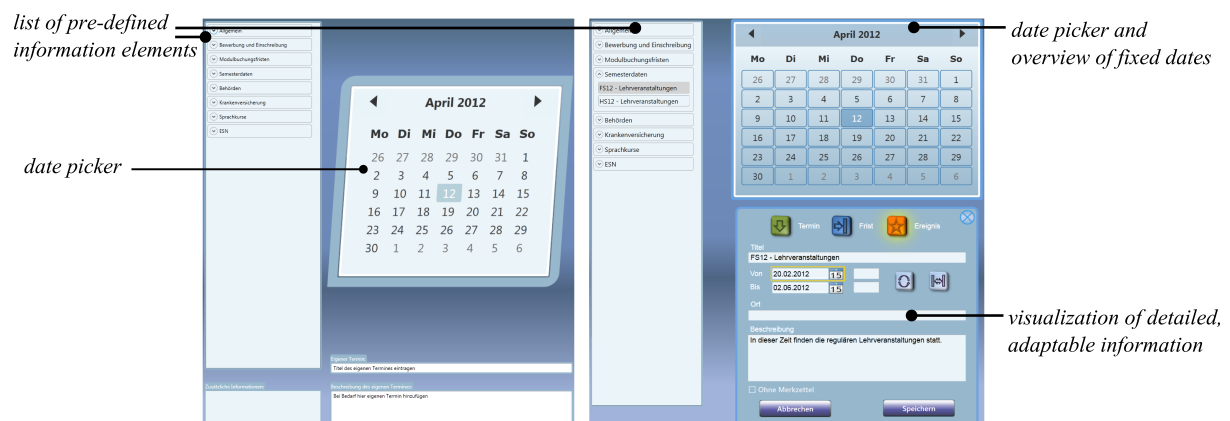


Figure 5: Providing detailed and adaptable information: the “planning”-part of the time screen in the first prototype (left) and the second prototype (right).

	Resulting Design Requirements
<i>Users' Need for Competence</i>	
DR1	Supporting the elicitation of the citizen's implicit needs
DR2	Supporting transparency in the states of collaboration (at all times) / Increase process transparency
DR3	Supporting joint problem-solving
DR4	Supporting the externalization and sharing of mental models
DR5	Improve information quality
DR5.1	Inform the advisory process with offline and online information resources from different governmental levels
DR5.2	Integrating internal and external information
<i>Users' Need for Autonomy</i>	
DR6	Support the evolution of process structure during collaboration
DR7	Supporting the personalization of information
DR7.1	Support flexible aggregation of information
<i>Users' Need for Relatedness</i>	
DR8	Allow the users to establish a personal relationship among themselves during, and develop it after, the interaction
DR9	Foster verbal communication in the interaction

Table 1. The literature-based design requirements assigned to the SDT-needs.

	Resulting Design Requirements
<i>Users' Need for Competence</i>	
DR1	Supporting the elicitation of the citizen's implicit needs
DR2	Supporting transparency in the states of collaboration (at all times) / Increase process transparency
DR3	Supporting joint problem-solving
DR4	Supporting the externalization and sharing of mental models
DR5	Improve information quality
DR5.1	Inform the advisory process with offline and online information resources from different governmental levels
DR5.2	Integrating internal and external information
DR5.3	Provide detailed information
<i>Users' Need for Autonomy</i>	
DR6	Support the evolution of process structure during collaboration
DR6.1	Support structuring with mandatory activities
DR7	Supporting the personalization of information
DR7.1	Support flexible aggregation of informational building blocks
DR7.2	Allow annotation of information
<i>Users' Need for Relatedness</i>	
DR8	Allow the users to establish a personal relationship among themselves during, and develop it after, the interaction
DR9	Foster verbal communication in the interaction
DR10	Enable professional interaction among advisors

Table 2. Set of design requirements for advisory supportive IT after the first evaluation; additions marked in bold.

	Design Requirements
<i>Constraint affecting all Design Requirements</i>	
Constraint	Implemented functions and their use should not negatively affect direct advisor-client communication
<i>Users' Need for Competence</i>	
DR1	Supporting the elicitation of the citizen's implicit needs
DR2	Supporting transparency in the states of collaboration (at all times) / Increase process transparency
DR3	Supporting joint problem-solving
DR4	Supporting the externalization and sharing of mental models
DR5	Improve information quality
DR5.1	Inform the advisory process with offline and online information resources from different governmental levels
DR5.2	Integrating internal and external information
DR5.3	Provide different levels of detail
<i>Users' Need for Autonomy</i>	
DR6	Support the evolution of process structure during collaboration
DR6.1	Support structuring with mandatory activities
DR7	Supporting the personalization of information
DR7.1	Support flexible aggregation of informational building blocks
DR7.2	Allow annotation on fine-grained information
<i>Users' Need for Relatedness</i>	
DR8	Allow the users to establish a personal relationship among themselves during, and develop it after, the interaction
DR9	Foster verbal communication in the interaction
DR10	Enable professional interaction among advisors

Table 3. Final set of design requirements for IT-systems supporting self-determined users in citizen advisory services; additions and modifications compared to the literature-based design requirements marked in bold.